

Literacy and Numeracy Difficulties in the Irish Workplace: Impact on Earnings and Training Expenditures

Elish Kelly
Seamus McGuinness
Philip J. O'Connell

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National Adult Literacy Agency
Áisíneacht Náisiúnta Litearthachta do Aosaigh



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Whitaker Square, Sir John Rogerson's Quay, Dublin 2

National Adult Literacy Agency
Sandford Lodge, Sandford Close, Ranelagh, Dublin 6

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The Author

Elish Kelly is a Research Analyst, Seamus McGuinness is an Associate Research Professor and Philip J. O'Connell is a Research Professor and Head of Social Research at the Economic and Social Research Institute.

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Glossary

ALS:	Adult Literacy Service
CSO:	Central Statistics Office
DES:	Department of Education and Skills
DLS:	Distance Learning Service
DSP:	Department of Social Protection
ESRI:	Economic and Social Research Institute
HRM:	Human Resource Measures
IALS:	International Adult Literacy Survey
NALA:	National Adult Literacy Agency
NES:	National Employment Survey
NTF:	National Training Fund
OLS:	Ordinary Least Square
PIAAC:	Programme for the International Assessment of Adult Competencies
QNHS:	Quarterly National Household Survey
QR:	Quantile Regression
VEC:	Vocational Education Committee

Foreword

The importance of literacy and numeracy in the modern workplace has drawn considerable attention from policy makers and researchers in recent years. The focus has been primarily on the acquisition of these skills during formal schooling and how to improve our school system to ensure better outcomes in this area. There has been far less concern with those already in work who have not attained the requisite levels of literacy and numeracy in their initial education. This is despite the ample international research which details the obstacles people with literacy and numeracy issues will face throughout their lives and in particular in their careers.

The National Adult Literacy Agency (NALA) aims to bring the situation of adults with literacy and numeracy needs centre stage so that there can be a greater response to the estimated 1 in 4 Irish adults who have literacy difficulties. NALA's work is also informed by the findings in the International Adult Literacy Survey (IALS) country report¹ for Ireland that over 1/6th of those with serious literacy difficulties are employed. In this context NALA began to promote and support workplace literacy learning and basic education in 1998 and successfully called for the establishment of the Workplace Basic Education Fund which now supports the Skills for Work Initiative. This enables employers and employees to access literacy and numeracy skills support through their local education and training provider.

This work is still in its infancy and needs further promotion, development and research for it to grow and become a key part of workplace education and training. To progress the research agenda NALA had discussions with researchers at the Economic and Social Research Institute (ESRI). They identified an existing data set that asked employees and employers about training needs in the workplace including literacy and numeracy needs. The Central Statistics Office (CSO) produced a descriptive publication on this data in 2009, in which the analysis was based on the firms' responses.² NALA felt it was important to examine the employee data also and commissioned the ESRI to carry out this analysis and provide a report on the findings.

¹ Morgan, M., Hickey, B., Kelleghan, T. *International Literacy Survey: Results for Ireland* (1997) Department of Education and Science, Dublin, Stationary Office.

² <http://www.cso.ie/en/media/csoie/releasespublications/documents/earnings/current/empskills.pdf>

The findings from this research, the first of its kind in Ireland, reveal a small percentage of employees and employers reporting literacy and numeracy training needs. The authors of the report indicate that the levels of literacy difficulties reported in the National Employment Survey (NES) data might be understated and that there are a number of reasons, including the data collection tool used in the NES, which was a self-administered questionnaire.

Other international research has identified serious levels of under reporting of literacy and numeracy difficulties by individuals because of fear, stigma and over assessment of literacy and numeracy skills. NALA particularly believes that the test based data contained in the IALS and referred to above is evidence of this under reporting. Research carried out more recently by the Scottish Government³ shows that people assessed their own literacy and numeracy capabilities for the workplace as excellent or good despite scoring poorly in an assessment. Based on the significant difference between objective test based research and self reporting, NALA believes that employees with literacy and numeracy needs are unlikely to report them in their workplaces.

Moreover, this report finds that private sector employers with literacy and/or numeracy difficulties do not invest in training to address these skills gaps. This may be because such employers do not recognise the existence of these skills gaps among their workforce, or, if they do, that they do not perceive that such gaps impact productivity or performance to the extent that investment in training is required to address the skill gaps. The stigma attached to literacy and numeracy issues has long held people back from returning to education generally but more specifically in a workplace setting. This is why NALA in partnership with the Department of Education and Skills, VECs and others began the development of distinctive approaches to literacy and numeracy provision in the workplace over a decade ago.

The research findings have also confirmed the trend that literacy and numeracy issues are most prevalent amongst those with low educational attainment. It is particularly worth noting that within this broad grouping, those with Junior Certificate qualifications have a higher incidence than those with no formal education qualifications. Higher incidences are also noted amongst older workers and those working in the private sector. NALA holds that these groups have long been overlooked in more

³ <http://www.scotland.gov.uk/Publications/2010/07/22091814/0>

traditional workplace learning opportunities and as such should now benefit from targeted provision. The findings also show a greater prevalence of need in certain sectors including the Wholesale and Retail sector, and this reinforces the findings outlined in the Future Skills Needs of the Wholesale and Retail Sector report of the Expert Group on Future Skills Needs (2010).

Perhaps the most significant finding in the report relates to the wage differential for those with literacy and numeracy needs. It is clear that there are costs to individuals and society associated with low levels of literacy and numeracy. This is evidenced in research from other parts of the world and now the findings in this report confirm this is also the case in Ireland. In addition the findings highlight that costs are not evenly spread across all those with literacy and numeracy difficulties but that some groups are more adversely affected including women and those who work full time in the private sector. It was also found that the negative wage impact from having a numeracy difficulty is confined to those with low earnings, while employees with middle to upper level earnings are most negatively affected by having a literacy difficulty.

It is clear that Government support for the Workplace Basic Education Fund is critical to the raising of literacy and numeracy skills amongst employees so they can develop in their career and increase their earning potential. The potential for increased earnings should feature in the promotion of the Skills for Work Initiative and other programmes that target people with literacy and numeracy difficulties.

The findings have led us to make the following recommendations:

1. The forthcoming SOLAS Implementation Plan should outline how the literacy and numeracy needs of employees and their employers will be addressed.
2. An integrating literacy and numeracy approach to vocational education and training should be adopted by SOLAS and all publicly funded providers.
3. The Workplace Basic Education Fund should be maintained and developed as the key response to raising literacy and numeracy levels in the workplace. Development should take account of the findings in this report regarding the greater vulnerability to risk of certain groups and employment sectors.

4. The overall spend on publically supported workplace education and training should be monitored to ensure that those most at risk of loss of career opportunities and income are prioritised.
5. A dedicated awareness raising campaign involving all key stakeholders, should be rolled out. This should be aimed at employees and employers and highlight the prevalence of literacy and numeracy issues in the workplace in an attempt to reduce the stigma attached to this area. This would also highlight the options and benefits of returning to learning.
6. There should be further research into the incidence and impact of literacy and numeracy difficulties in the workplace and ways to best to respond to these. This will help inform policy development in this area.

NALA is grateful to the authors for their work on this report and the analysis underpinning it. We hope that it will provoke further development in this area as well as new research.

Inez Bailey

Director

NALA

Executive Summary

There is an extensive literature that illustrates the importance of basic literacy and numeracy skills for individual earnings, over and above the impact of educational attainment (e.g. Vignoles, De Coulon and Marcenaro-Gutierrez, 2011; Grinyer, 2005; Dougherty, 2003; Denny, Harmon and O’Sullivan, 2003; McIntosh and Vignoles, 2001). However, very little research has been undertaken in Ireland on the relationship between earnings and such skill gaps, and there appears to be no previous work on the impact that such difficulties might have on private sector firms’ training expenditures.

Given the scarcity of research in this area, the current study uses data from an employer-employee linked dataset, the October 2006 National Employment Survey (NES), to assess the impact of literacy and numeracy difficulties on employees’ earnings, along with their effect on private sector firms’ training expenditures. The specific questions that are addressed in the report are as follows:

1. What is the overall incidence of literacy and numeracy difficulties in the Irish workplace, and how do such needs vary by i) gender, ii) age, iii) education, iv) nationality, v) employment sector (public/private), vi) industry and vii) work type (full-time/part-time)?
2. What is the correlation between literacy and numeracy needs and other skill gaps;⁴ specifically, i) communication skills, ii) customer service skills, iii) IT skills (general and professional), iv) language skills (English and foreign), v) management skills, vi) and technical and practical skills?
3. Controlling for the impact of various other wage-determining characteristics, including educational attainment, what are the separate effects of literacy and numeracy difficulties on individual earnings, both their overall impact and also their effect across the wage distribution? In addition, do the results vary by i) gender, ii) employment sector (public/private) and iii) work type?
4. What are the incidences of literacy and numeracy skill gaps at the level of the firm?⁵
5. Do literacy and numeracy skill gaps impose additional training expenditures on private sector firms?

⁴ In the employee-level analysis that is conducted in this report, a skill gap is identified when an employee believes that he/she requires training in a particular competency area (e.g. literacy, numeracy, communication skills, customer service, foreign languages, etc.) in order to undertake their current job.

⁵ For the private sector firm-level analysis, skill gaps refer to an observation at the firm-level in which a high proportion of employees, in this case 20 per cent or more, believe that they need training in a specific competency (e.g. literacy, numeracy, management, customer service, communication, etc.).

The main findings from the study are as follows:

EMPLOYEES

Overall:

1. In 2006, 1.5 per cent of employees indicated that they had a literacy difficulty, while 2 per cent reported a numeracy difficulty. The rates for both skill gaps were higher among males than females.
2. Contrary to what might be expected, when we looked at the prevalence of literacy and numeracy difficulties by educational attainment, we found that 6 per cent of those with a Junior Certificate qualification reported having a literacy difficulty, while 9 per cent indicated that they had a numeracy difficulty. The corresponding figures for those with no formal education were 5 per cent (literacy difficulty) and 7 per cent (numeracy difficulty) respectively.
3. Literacy difficulties were found to reduce an individual's earnings by 4.6 per cent. The wage discount associated with such difficulties was larger for females (6.3 per cent) than for male employees (4.3 per cent), which is a noteworthy finding given that a slightly higher proportion of males reported having literacy difficulties.
4. On average, no wage penalty was found for numeracy difficulties. However, we did identify a marginal negative wage effect for employees with this skill gap that worked full-time.

Sector:

1. Similar proportions of public and private sector employees reported having a literacy difficulty, while a slightly higher percentage of private sector workers indicated that they had a numeracy difficulty.
2. The highest incidence of literacy skill gaps was reported by those working in the transport sector, while the lowest was recorded among financial sector and education workers. In relation to numeracy difficulties, those employed in the wholesale and retail, transport and other services sectors reported the highest incidence of such difficulties, while the lowest was recorded among those employed in the education and financial sector industries.
3. We found that the wage penalty associated with literacy difficulties is confined to the private sector, and in particular those working full-time: individuals reporting literacy difficulties employed in this labour market earn 8.1 per cent less, a substantial wage penalty.

Earnings Distribution:

1. The wage distribution analysis revealed that it is employees that are in the middle to the upper end of the earnings distribution that are most negatively affected by having a literacy difficulty. This result is over and above the impact of educational attainment; thus, while individuals with low levels of education can progress up the wage distribution, the wage penalty attached to having a literacy difficulty increases somewhat as one moves up the earnings distribution. The earnings distribution analysis also showed that the earnings loss associated with having a numeracy difficulty is concentrated among full-time workers in the very bottom of the earnings distribution.

FIRMS

1. In relation to our private sector firm-level analysis, a firm was regarded as incurring a literacy and/or numeracy skill gap, or a skill gap in any of the competency areas analysed, if 20 per cent or more of employees indicated that they required training in literacy and/or numeracy. This analysis found that 1.4 per cent of private sector firms experienced significant literacy skill gaps among their staff, with the corresponding figure for numeracy skill gaps standing at 2.4 per cent.
2. The distribution of both literacy and numeracy skill gaps was generally evenly spread across industries; nevertheless, the incidence was substantially higher in the transport sector and lower in the financial sector.
3. There was also some evidence that both literacy and numeracy skill gaps were more common in very large private sector firms employing more than 100 people.
4. We found no evidence that either literacy or numeracy skill gaps substantially raised private sector firm-level training expenditures. The research also revealed that such employers were more likely to respond to skill gaps in the areas of management or foreign languages, as both of these competency gaps increased firms' average training expenditures.

Chapter 1

Introduction

There is an extensive literature that illustrates the importance of basic literacy and numeracy skills for individual earnings, over and above the impact of educational attainment (e.g. Vignoles, De Coulon and Marcenaro-Gutierrez, 2011; Grinyer; 2005, Dougherty, 2003; Denny, Harmon and O’Sullivan, 2003; McIntosh and Vignoles, 2001). However, very little research has been undertaken in Ireland on the relationship between earnings and such skill gaps,⁶ and there is no previous work on the impact that such difficulties might have on private sector firms’ training expenditures. Given the scarcity of research in this area, this current study uses data from an employer-employee linked dataset, the October 2006 National Employment Survey (NES), to assess the impact of literacy and numeracy difficulties on employees’ earnings, along with their effect on private sector firms’ training expenditures. The NES, which is administered by the Central Statistics Office (CSO), covers both the public and private sectors. Data on literacy and/or numeracy issues are not collected on a regular basis in Ireland. However, the October 2006 NES collected such data and, therefore, provides us with a unique opportunity to assess the extent of literacy and numeracy difficulties in the Irish workplace, along with the impact that such skill gaps have on individuals’ earnings and on private sector firms’ training expenditures.⁷

In the context of this study, literacy and numeracy skill gaps were identified and measured through the following self-assessed question: “For your current job, do you require training in any of the following areas: i) communication skills, ii) customer service skills, iii) IT skills – general, iv) IT skills - professional, v) language skills – English, vi) language skills - foreign, vii) literacy skills, viii) management skills, ix) numeracy skills, x) technical and practical skills, xi) other?” Since this question relates to an employee’s current job, the respondent, regardless of educational attainment, could have indicated that they needed training in literacy

⁶ See Dorgan (2009) for a summary of previous Irish research that examines the importance of literacy in determining earnings.

⁷ The International Adult Literacy Survey (IALS) was the last survey that was carried out on adult literacy: this study was undertaken in 1995 (results published in 1997). Ireland is currently participating in the Programme for the International Assessment of Adult Competencies (PIAAC), the results from which are due to be published in October 2013. Every year each Vocational Education Committee (VEC) sends information to the Department of Education and Skills (DES) on the adult literacy service courses that they provide. In 2011, the National Adult Literacy Agency (NALA) compiled a report on this data, which gave a profile of adult literacy participants in VEC adult literacy services from 2000 to 2009, along with tuition trends (see Daverth and Drew, 2011, for more details). Data on literacy and/or number difficulties among unemployed individuals is captured in the DSP/ESRI Profiling Project Dataset (see O’Connell, McGuinness, Kelly and Walsh, 2009, for more details).

and/or numeracy skills. Given that we are specifically interested in identifying those that lack basic literacy and numeracy skills, we define those with a literacy or numeracy difficulty as combining a Junior Certificate qualification or less⁸ with a response to this question that they required literacy or numeracy training. Another important point to note is that given that the NES data comes from a self-completed questionnaire, employees with severe literacy difficulties may not have been able to complete the survey. Thus, the survey mode used to collect the data (self-completed questionnaire as opposed to interview-based) means that the estimates of literacy difficulties that are presented in this report may be understated (see Chapter 3).

The first objective of this report is to identify the overall incidence of literacy and numeracy difficulties in the Irish workplace, and to establish how do such needs vary by i) gender, ii) age, iii) education, iv) nationality, v) employment sector (public/private), vi) industry and vii) work type (full-time/part-time). We then move on to assess the correlation between literacy and numeracy needs and other skill gaps; specifically, i) communication skills, ii) customer service skills, iii) IT skills (general and professional), iv) language skills (English and foreign), v) management skills, and vi) technical and practical skills. The third research question is to identify the separate effects of literacy and numeracy difficulties on individual earnings, both on average and also across the wage distribution. In doing this, we control for the impact of various other wage-determining characteristics, including educational attainment, labour market experience etc. In examining the earnings question we also test for the degree to which any literacy and numeracy wage penalty varies by i) gender, ii) employment sector (public/private) and work type (full-time/part-time). Finally, we investigate the separate effects of literacy and numeracy skill gaps at the level of the firm, specifically private sector enterprises, by examining both the incidence of literacy and/or numeracy problems within Irish workplaces and the degree to which such gaps impose additional training expenditures on firms.

In Ireland, there is a range of services available to those with literacy difficulties in the workplace. Specifically, there are approximately 2,000 individuals participating in the Skills for Work initiative. This scheme, which is run through the Vocational Education Committee (VEC) adult literacy service and is funded by the National Training Fund (NTF),⁹ provides for literacy and numeracy

⁸ Includes individuals with primary-level and no formal education.

⁹ The National Training Fund was established under the National Training Fund Act, 2000, and is a fund that is dedicated to financing a range of employee training schemes. The Fund is resourced by a levy on employers.

development for employees in a workplace setting.¹⁰ The courses covered by the initiative, which include communications, computing, interpersonal skills, technical English, problem-solving and report writing, have literacy and numeracy elements integrated into them. There are also almost 57,000 individuals participating in VEC Adult Literacy Service (ALS) courses,¹¹ of whom 28 per cent are in employment. In addition to this, the National Adult Literacy Service (NALA) provides a Distance Learning Service (DLS) to all individuals with literacy difficulties, approximately half of whom are in employment.¹²

¹⁰ Programmes are usually delivered on the company premises, and their length is agreed between the employer and programme coordinator.

¹¹ Courses funded by the Department of Education and Skills (DES).

¹² Hegarty, A. and M. Feeley 2010. NALA Distance Learning Services: Providing Effective Stepping-Stones for Adult Literacy Learners. Dublin: NALA.

Chapter 2

Literature

Literacy and numeracy are key factors shaping individual life chances and their impact is particularly critical in the labour market. Large-scale sweeping changes in the organization of work, including the shift from manufacturing to services, and the spread of information technology in the information economy, have progressively increased the importance of basic skills, including literacy and numeracy. In a context of increasing inequality in earnings, there is concern about the declining economic position of those with low qualifications and skills, including literacy and numeracy. Bynner (2004) in his review of UK research shows the significance of literacy and numeracy skills not only in gaining employment on leaving school, but in retaining it and progressing in it. Recent work in Ireland shows that unemployed individuals with literacy and/or numeracy difficulties are at greater risk of becoming long-term unemployed, although there are significant returns to investment in education and training for unemployed individuals with such skills difficulties (Kelly, McGuinness and O'Connell, 2012).

Research on the impact of formal educational attainment has advanced considerably in recent years. While it is expected that literacy and numeracy difficulties may lead to lower earnings from work, empirical work to measure the precise impact of such basic skills is limited both in the international literature in general, and in Ireland in particular. Thus, while there is some international research that examines the *separate* effects of literacy and numeracy on earnings, such research in Ireland is rare.¹³

One of the key issues in international research in this area is to separate out the contributions of literacy and numeracy to earnings, net of the, potentially separate, effect of educational attainment. Part of the problem relates to the fact that there is a strong association between literacy and numeracy on the one hand, and educational attainment, on the other. Typically, in standard econometric models¹⁴ of earnings, the inclusion of a measure of literacy or

¹³ See Dorgan (2009) for a summary of previous Irish research that focuses on the importance of literacy in determining earnings.

¹⁴ Econometric, regression and multivariate models are terms that are used interchangeably throughout the report. They refer to techniques that allow for the isolation of relationships between a dependent and independent variable (e.g. earnings and literacy difficulty respectively), holding the effects of all other independent variables (e.g. educational attainment, gender, etc.) constant.

numeracy skills lowers the estimated effects of educational attainment. Where the decline in the effect of education is substantial when a measure of literacy is included, this is likely to be due either to a high correlation between education and literacy or to high returns to literacy skills.

One of the earliest studies in this area found that a measure of quantitative or numerical ability had a significant effect on the earnings of high school and college graduates in the US, but not the earnings of high-school or college drop-outs (Hause, 1972). The study did not include a measure of literacy, but its importance is to suggest that the impact of numeracy is at least partially independent of, and varies by, level of education attainment. More recent work in the UK which found that numeracy had a significant effect on earnings, controlling for education, provides support for the earlier US findings (McIntosh and Vignoles, 2000). McIntosh and Vignoles also found that the impact of numeracy was stronger in the lower part of the income distribution, and they found that literacy as measured in the International Adult Literacy Survey (IALS) data also had a positive impact on earnings, but that literacy as measured by the UK National Child Development Study had no significant impact. In other work, McIntosh and Vignoles (2001) concluded that “individuals with better literacy and numeracy skills, even after allowing for an independent effect from their qualification level and ability on entry to school, earn more and are more likely to be employed than those with poorer skills.” The earnings effects of numeracy skills exceeded those of literacy. In addition, the study found that poor literacy skills were also associated with poorer health, a higher incidence of depression, and increased likelihood of having a child with literacy and numeracy difficulties.

Dougherty (2003), attempting to separate out the effects of education versus literacy and numeracy using US data, found that numeracy had a highly significant effect on earnings, an effect that mostly occurred through its impact on educational attainment, but that it also had a direct effect, controlling for education. Dougherty also found that while literacy was strongly associated with educational attainment, there was no evidence of a separate direct effect of literacy on earnings. Tyler (2004) showed that numerical skills, as assessed by a post-school-leaving mathematics test, is associated with higher earnings among a sample of high school drop-outs in the US, and interprets his results to suggest that programmes aimed at increasing the basic cognitive skills of drop-outs, prior to or after drop-out, could increase earnings in the early years after labour market entry. Grinyer (2005) found positive correlations between both literacy and numeracy and earnings in his analysis of the UK Skill for Life survey data. He also found positive effects on earnings from attending an adult literacy or

numeracy course; he notes that the returns are highest among those with no or low qualifications, although levels of participation by such groups are low.

Kenny, Harmon and O'Sullivan (2003) in a cross-national analysis of IALS data, show that, as expected, controlling for functional literacy (which is measured as an average of performance scores in tests of prose, document and quantitative literacy), lowers the estimated effect of education in a wage equation. Their estimate of the direct effect of functional literacy was positive, substantial in many countries and statistically significant in most. They found that the direct effect of functional literacy in Ireland was high by international standards. Research also exists for Canada (see, for example, Scott Murray et al., 2009) and a range of other European countries (see, for example, DataAngel Policy Research Incorporated, 2009, for Portugal) that show the positive effects of addressing literacy and basic skill needs on employment, earnings and a range of other economic measures.

Research at the level of the firm on employer investment in training of employees is limited. Previous research has suggested that larger firms, and those with more educated workforces, are more likely to invest in training. Irish research confirms these patterns and also suggests that employees in firms that implement high involvement or 'high performance' work practices tend to invest more in training (O'Connell and Byrne, 2012). Research on the impact of training on firm performance is particularly scarce (see, for example, Ananiadu, Jenkins, and Wolf, 2003; Black and Lynch, 1997), although Barrett and O'Connell (2001) find positive effects of employer-sponsored training on firm-level productivity. Such studies, however, are generally confined to aggregate measures of training, and do not specifically consider either the determinants or the impact of training in basic skills, such as literacy and numeracy.

In summary, there is substantial consistency in the findings from the limited research available on the impact of literacy and numeracy on earnings. Most studies suggest that literacy and numeracy have positive effects on earnings, even when other relevant factors such as personal characteristics and human capital (e.g. education, etc.) endowments are taken in to account. In general, the positive effects of numeracy are higher than those for literacy, although it should be noted that literacy skills are frequently a prerequisite to increasing numeracy. A noteworthy additional finding emerging from recent work is that training to improve basic skills can have positive effects on both earnings and employment chances, although participation in such training by those who would stand to benefit most tends to be low. Research on employer sponsorship of training in

basic skills for employees is extremely underdeveloped, and in this paper we include an exploratory contribution to this field of research.

Chapter 3

Data and Methodology

3.1 DATA

The data used in this study comes from the October 2006 National Employment Survey (NES). The NES is an employer-employee linked workplace survey covering both the public and private sectors,¹⁵ which is carried out by the Central Statistics Office (CSO).¹⁶ The objective of the NES, which is a compulsory survey,¹⁷ is to provide detailed data on earnings across the economy, along with factors influencing earnings (e.g. gender, age, educational attainment, nationality, etc.) and also detailed information on workplace issues.

The employer sample for the October 2006 NES was drawn from the CSO's Central Business Register: those firms that were chosen were asked to select a systematic sample of employees from their payrolls, and the CSO then administered a questionnaire to both entities. The NES questionnaire was self-completed by both firms and employees as opposed to the data being collected through one-to-one interviews. A total of 8,383 firms were surveyed, employing 68,427 individuals. From these samples, 4,209 firms and 51,252 employees completed their respective questionnaire, which gives a response rate of just over 50 per cent from firms and 75 per cent from employees. For the employee-level analysis, we focus on the working-age population (i.e. those aged 16 to 64), which gives us a final sample of 50,662 employees.¹⁸ In order to ensure that our results are representative of the working age employee population, we applied cross-sectional weights to our data. For the firm-level component of the study we concentrate on the private sector, of which there are 4,035 firms. Again, we applied enterprise-level weights to make sure that our firm-level results are representative.

¹⁵ Agriculture, forestry and fishing is the only sector that is excluded from the NES. As it is a work-place survey, the self-employed are excluded as well.

¹⁶ While the NES consists of enterprises with three or more employees, the results are calibrated to the Quarterly National Household Survey (QNHS) employment data for employees (excluding agriculture, forestry and fishing), which covers all employees.

¹⁷ The October 2006 NES was a statutory survey carried out under European Communities (Statistics) (National Employment Survey) Regulations 2007 and Statistics (National Employment Survey) Order 2007 to meet EU requirements for earnings and national statistical requirements (for more details see: http://www.cso.ie/en/media/csoie/surveysandmethodologies/surveys/earnings/documents/pdfdocs/nas_quality_report.pdf).

¹⁸ Characteristic information on the sample used in the study is contained in Appendix Table A1.

In relation to the information that is captured in the NES, the employer questionnaire requested data on employee earnings,¹⁹ hours worked, occupation, pay agreements for employees, company training and detailed information on a specific workplace issue: the October 2006 NES focussed on vacancies and skills in the enterprise. The NES also contains data on firm size and industry.

In the employee questionnaire, gender, age, nationality, educational attainment, employment history, professional body membership, trade union membership and other job-related characteristic (e.g. shift-work, supervisory role, flexi-time, etc.) data were gathered. In the October 2006 NES, employees were also asked to provide information on workplace skills; specifically, how employees acquired the skills for their current job and the skill areas they felt that they required training in. It was from this latter question that those with literacy and numeracy difficulties were identified: “For your current job, do you require training in any of the following areas: i) communication skills, ii) customer service skills, iii) IT skills – general, iv) IT skills - professional, v) language skills – English, vi) language skills – foreign, vii) literacy skills, viii) management skills, ix) numeracy skills, x) technical and practical skills, xi) other?” As this question relates to the respondent’s current job, an individual with a third-level qualification could have indicated that he/she needed training in literacy and/or numeracy skills equally as someone with low educational attainment. Given that we are specifically interested in identifying individuals that lack basic literacy and numeracy skills, we define those with a literacy or numeracy difficulty as combining a Junior Certificate qualification or less²⁰ with a response to this question that they required literacy or numeracy training.

In the context of this study, there is an important limitation with the NES data that needs to be highlighted. Specifically, given that the data comes from a self-completed questionnaire, the estimates of the incidence of literacy difficulties that are presented in this report may be understated because employees with acute literacy difficulties may not have been able to complete the survey.

¹⁹ The earnings information collected in the October 2006 NES represents the gross monthly amount (before the deduction of tax, PRSI, superannuation) payable by the organisation to its employees, and the reference month is October 2006. The gross monthly measure includes i) normal wages, salaries and overtime; ii) taxable allowances, regular bonuses and commissions; and iii) holiday or sick pay for the period in question, while it excludes i) employer’s PRSI, ii) redundancy payments and iii) back pay.

²⁰ Includes individuals with primary-level and no formal education.

3.2 METHODOLOGY

In terms of methodology, for the employee-level analysis we begin by estimating standard Ordinary Least Square (OLS)²¹ earnings regressions with separate dummy variables²² for literacy and numeracy difficulties included in our models to identify the impact of each on a person's earnings. We focus on hourly earnings and include controls²³ for a range of other important wage-determining characteristics. Specifically, we control for gender, nationality, educational attainment, work experience, professional body membership, trade union membership, supervisory role, shift-work, work type (full-time/part-time) and industry. This earnings equation can be written as follows:

$$W_i = \beta_1 X_i + \beta_2 \text{Literacy} + \beta_3 \text{Numeracy} + \varepsilon_i \quad (1)$$

where W_i is the log hourly earnings of employee i ; X_i is a set of controls for productivity-related and job characteristics of employee i (e.g. gender, education, experience, etc.) and β_1 measures the return to each of the characteristic controls; *Literacy* and *Numeracy* are dummy variables that capture whether an employee has a literacy and/or numeracy difficulty respectively and β_2 and β_3 respectively measure the impact of each of these skill gaps on an employee's earnings, that is, the wage penalty associated with each difficulty; and ε_i is the error term: the error term captures all those factors that have an effect on earnings but which are not taken into account explicitly in the estimated model. We begin by estimating an OLS model on all working-age employees. Then we estimate separate male and female earnings models to identify if the wage effects of literacy and numeracy difficulties vary by gender. We also estimate separate models for the public and private sectors, and for the full-time and part-time labour markets.

We then use Quantile Regression (QR)²⁴ with, again, two dummy variables to capture literacy and numeracy difficulties included in our specification to identify

²¹ OLS is a method of regression analysis. As indicated previously, regression analysis is a technique that allows for the isolation of relationships between a dependent and independent variable holding the effects of all other independent variables constant.

²² A dummy variable is a variable that is used to indicate the presence or absence of a particular attribute (e.g. literacy difficulty or not). The variable takes on values of zero or one, with zero indicating the absence of the particular attribute (e.g. no literacy difficulty) and one indicating the possession of that attribute (e.g. literacy difficulty).

²³ Term used to capture independent variables within econometric models: covariate is another word that is used to capture independent variables in a regression model. .

²⁴ QR is another method of regression analysis. As with OLS, the methodology allows for the isolation of a relationship between a dependent and independent variable. However, the added advantage of QR is that the approach allows for

how the wage penalty associated with each skills gap varies across the earnings distribution. The advantage of using this methodology is that it allows us to estimate the earnings penalty associated with having literacy and/or numeracy difficulties at different points along the wage distribution; thus, QR enables researchers to identify if the wage penalty associated with each skills gap varies over the income distribution. In this paper, we estimate the wage loss associated with having a literacy and/or numeracy difficulty at the 10th, 20th, 30th, right up to the 90th percentile. For this specific analysis, we estimate our model on the private-sector full-time labour market.

In relation to the private sector firm-level analysis, we estimate OLS average training expenditure models and include separate dummy variables that capture the average level of literacy and numeracy difficulties within firms to identify the impact of each skill gap on firms' average training costs. In general, firms' training expenditures reflect a belief among employers that skill deficiencies among staff are in some way adversely impacting company performance. Thus, if literacy and numeracy gaps are viewed as important factors by employers, they should have a positive impact on training expenditures. However, as the skill gap information is collected at the level of worker, we define a skill gap as having occurred at the level of the firm if more than twenty per cent of the workforce stated that they required training in the competency area. We also include controls for other factors that can influence firms' training expenditures, such as the mean human capital characteristics of the workforce, trade union density, firm size, and sector. This average training expenditures model can be written as follows:

$$T_c = \beta_1 \overline{HC} + \beta_2 SG + \beta_3 F + \varepsilon_i \quad (2)$$

where T represents average firm training expenditures; HC is the mean human capital²⁵ characteristics of the workforce and β_1 measures the return to each of these controls; SG relates to the presence of skill gaps and β_2 measures the impact of each of these gaps; F denotes other firm-level characteristics and β_3 captures the impact of these, ε denotes the model error term.

the assessment of how the relationship between a dependent and independent variable changes as one moves up and down the wage distribution.

²⁵ Human capital refers to a person's characteristics, such as educational attainment or their level of work experience, that substantially contribute to their earnings potential.

Chapter 4

Incidence of Literacy and Numeracy Difficulties in the Irish Workplace

4.1 INCIDENCE OF LITERACY AND NUMERACY DIFFICULTIES AT THE INDIVIDUAL-LEVEL

Tables 4.1 and 4.2 respectively examine the incidence of literacy and numeracy difficulties in the Irish workplace. In addition to assessing the overall incidence of such skill gaps, separate results are also presented by:

- gender,
- age,
- nationality,
- educational attainment,
- employment sector (public/private),
- industry,
- work-type (full-time/part-time), and
- trade union membership.

Overall, 1.5 per cent of employees surveyed in the October 2006 NES indicated that they had a literacy difficulty, while 2 per cent reported a numeracy difficulty; the rates for both skill gaps were higher among males (1.7 and 2.3 per cent for literacy and numeracy difficulties respectively) than females (1.2 and 1.7 per cent respectively). Based on the International Adult Literacy Survey (IALS), which was the last survey that was carried out on adult literacy in Ireland, and was undertaken in 1995, over one-sixth of individuals in employment scored at the lowest level of literacy performance (OECD, Human Resource Development Canada and Statistics Canada, 1997). This IALS figure, which is based on an objective and intensive test of literacy skills in several domains, is noticeably higher than that reported in the 2006 NES. There are a few reasons why the incidence of literacy difficulties in the NES data, which is based on self reporting, might be underestimated. First, as indicated earlier, it may be because employees with severe literacy difficulties were not able to complete the NES questionnaire and, therefore, are excluded from the analysis. Second, it is known from the IALS (OECD, Human Resource Development Canada and Statistics Canada, 1997) that individuals with literacy difficulties tend to over assess their ability in comparison to formal tests, i.e. they under assess their literacy difficulties; thus, such individuals may not have indicated that they needed literacy training when

completing the NES questionnaire. Finally, it is also possible that employees may choose to under-report their literacy needs because of stigma around the existence of such a difficulty.

When we looked at the prevalence of literacy and numeracy difficulties by *educational attainment*, we found that those with Junior Certificate qualifications reported slightly higher rates of both skill gaps compared to those with no formal education (i.e. primary or less). This result, which is contrary to expectations, may reflect the fact that those with no formal education are more likely than those with a Junior Certificate to be in lower, more routine, occupations that do not require high levels of literacy and/or numeracy skills.

Perhaps, unsurprisingly, when we analysed the frequency of literacy and numeracy difficulties across the *age distribution*, we found that each skill gap increased with age, with 3.4 per cent of those aged 55-64 reporting a literacy difficulty and 4.1 per cent a numeracy difficulty.

In relation to *nationality*, a slightly higher proportion of Irish employees reported both literacy and numeracy difficulties compared to non-Irish employees.

With regards to a person's sector of employment, 1.5 per cent of both public and private sector employees report having a literacy difficulty, while a slightly higher proportion of private sector workers reported numeracy difficulties (2.2 per cent compared to 1.3 per cent of public sector employees).

Regarding Industry, those employed in transport, other services and wholesale and retail reported the highest incidence of numeracy difficulties, while the lowest incidence was recorded among those employed in education and the financial sector. With respect to literacy gaps, the highest incidence was reported by those working in the transport sector and the lowest incidence was, again, recorded among financial sector and education workers.

Slightly higher proportions of part-time employees recorded having both literacy and numeracy difficulties compared to their full-time counterparts.

Finally, with respect to trade union membership, bigger numbers of trade union members reported having a literacy and/or numeracy difficulty.

TABLE 4.1: Incidence of Literacy and/or Numeracy Difficulties in the Irish Workplace (Per cent)

	Literacy	Numeracy
Overall	1.5	2.0
Gender:		
Male	1.7	2.3
Female	1.2	1.7
Age:		
16-24	0.9	1.7
25-34	0.6	1.0
35-44	1.7	2.3
45-54	2.3	2.5
55-64	3.4	4.1
Education:		
Primary or Less	5.4	6.8
Junior Certificate	6.3	8.9
Nationality:		
Irish	1.6	2.1
Non-Irish	1.0	1.1
Sector:		
Public	1.5	1.3
Private	1.5	2.2
Economic Sector:		
Manufacturing	1.6	2.3
Electricity	1.0	1.6
Construction	1.1	2.0
Wholesale and Retail	1.7	3.0
Hotels and Restaurants	1.6	2.6
Transport, Storage & Communication	3.3	3.1
Financial Sector	0.2	0.3
Business Services	1.5	1.7
Public Administration and Defence	1.7	1.8
Education	0.5	0.3
Health	1.8	1.4
Other Services	1.4	3.1
Work-Type:		
Full-Time	1.4	2.0
Part-Time	1.9	2.2
Trade Union Member:		
Yes	2.4	2.7
No	0.9	1.6

4.2 CORRELATIONS BETWEEN LITERACY DIFFICULTIES, NUMERACY DIFFICULTIES AND OTHER SKILL GAPS

In addition to requesting information on literacy and numeracy skill gaps, the October 2006 NES questionnaire also asked employees if they required training in nine other competency areas for their current job: i) communication skills, ii) customer service skills, iii) IT skills - general, iv) IT skills - professional, v) language skills - English, vi) language skills - foreign, vii) management skills, viii) technical and practical skills, and ix) other. In this section of the report, we investigate the correlation between these various skill gaps, focussing specifically on the relationships that literacy and numeracy needs have with each of the other skill gaps. From Table 4.2 we can see that the strongest correlations for literacy difficulties are with numeracy difficulties, English language skill gaps and, to a lesser extent, communication skill needs. The same results hold for numeracy difficulties, but the strength of the correlations varies slightly.

TABLE 4.2: Correlations between Literacy Difficulties, Numeracy Difficulties and Other Skill Gaps

	Commun	Cust Ser	IT-Gen	IT-Prof	Lang - English	Lang - Foreign	Lit	Manage	Num	Tech & Pract	Other
Communication	1										
Customer Service	0.5631	1									
IT-General	0.4056	0.3184	1								
IT-Professional	0.1219	0.0749	0.1502	1							
Language-English	0.4086	0.3301	0.2566	0.1122	1						
Language-Foreign	0.1388	0.1174	0.1527	0.174	0.2021	1					
Literacy	0.4112	0.3191	0.3445	0.1415	0.5266	0.1932	1				
Management	0.3729	0.2795	0.3083	0.2217	0.2099	0.1482	0.2582	1			
Numeracy	0.4454	0.375	0.3545	0.1338	0.4344	0.1266	0.5656	0.2849	1		
Technical & Practical	0.2752	0.1683	0.2078	0.1258	0.2169	0.0948	0.2704	0.2033	0.3002	1	
Other	0.0712	0.0238	0.0329	0.0361	0.0935	0.1033	0.117	0.033	0.0854	0.0448	1

Note: Skill gap abbreviations are as follows: i) Commun=Communication; Cust Ser=Customer Service; IT-Gen=IT skills-General; IT Prof=IT skills-Professional; Lang-English=Language skills-English; Lang-Foreign=Language skills-Foreign; Lit=Literacy; Manage=Management; Num=Numeracy; and Tech & Pract=Technical and Practical.

4.3 THE INCIDENCE OF LITERACY AND NUMERACY GAPS AT THE LEVEL OF THE FIRM

With respect to our firm-level analysis, we restrict the sample to private sector organisations only on the grounds that public sector information within the NES is collected at government department-level²⁶ and not organisational-level, rendering it impossible to assess the nature of responses to skill gaps among public sector employers. A firm is regarded as incurring a skill gap in any particular area if 20 per cent or more of employees indicate that they require training in the competency area. While 20 per cent is a somewhat arbitrary cut-off point, it is reasonable to assume that if more than 20 per cent of the workforce reports a training need in a particular area then the employer should be aware that an issue exists and respond accordingly.²⁷ When our data is reduced we retain over 4,000 firm-level observations. The percentage of firms identified as experiencing a literacy based skill gap was 1.6 per cent, with the corresponding figure for numeracy somewhat higher at 2.4 per cent. Some variation is apparent at the sectoral-level with both literacy and numeracy gaps somewhat higher than average within the transport, storage and communication sector, while they were non-existent within the financial sector (Table 4.3.1). With respect to organisation size, the evidence is suggestive of a slightly higher incidence of literacy and numeracy gaps within firms employing greater than 100 people (Table 4.3.2).

TABLE 4.3.1: The Incidence of Literacy and Numeracy Gaps by Sector

	% Employing Lit	% Employing Num
Manufacturing	1.5	2.7
Construction	1.6	2.2
Wholesale & Retail	1.7	3.2
Hotels & Restaurants	1.6	2.4
Transport, Storage & Communication	4.0	4.7
Financial Sector	0.0	0.0
Business Services	1.2	1.5
Education	1.5	1.5
Health & Social Work	1.8	1.8
Other Services	1.9	2.3
All	1.6	2.4

²⁶ For instance, there is only one return for the education sector (i.e. all primary and secondary schools are combined, regardless of size) and the Garda (regardless of station size).

²⁷ While 20 per cent is a somewhat arbitrary cut-off point, it is based on a reasonable assumption that if 20 percent or more of a workforce believe that they are deficient in a particular area then the employer should be aware of it. Furthermore, forthcoming research by McGuinness and Ortez demonstrate that the results are not highly sensitive to either the cut-off point used or the adoption of a continuous, as opposed to a binary, control.

TABLE 4.3.2: The Incidence of Literacy and Numeracy Gaps by Organisational Size

	%Employing Lit	% Employing Num
Firm Size:		
1 to 9	1.4	2.1
10 to 19	1.7	2.1
20 to 49	1.7	2.5
50 to 99	1.4	2.3
100 plus	2.0	3.5

Chapter 5

Impact of Literacy and Numeracy Difficulties on Employees' Earnings

5.1 ALL EMPLOYEES

In this section of the report we use multivariate analysis to identify the individual impact of literacy and numeracy difficulties on employees' earnings. As indicated previously, the analysis is based on the working-age population. The results for the analysis of all employees are presented in Column 1 in Table 5.1. In relation to our variables of interest, we found that there is a wage penalty associated with having a literacy difficulty. Specifically, this skill gap reduces a person's earnings by 4.6 per cent. With regards to numeracy difficulty, while the coefficient on this variable is negative, suggesting that there is also a wage discount associated with this skill gap, its effect is not significant. The other covariates that we included in our model, the results for which are presented in the Appendix in Table A2, behave according to expectations, with higher levels of educational attainment and experience increasing a person's earnings, as does being a member of a professional body, a full-time employee, a member of a trade union and having a supervisory role in work. Nationality is another important wage-determining characteristic with non-Irish individuals earning 11.2 per cent less than Irish citizens. We also found that there is a wage penalty associated with shift-work, which reduces a person's earnings by 3.1 per cent. In relation to a person's industry of employment, those employed in the electricity, construction, transport, financial sector, public administration and defence, education and health sectors all have higher hourly earnings compared to those employed in manufacturing, while workers in wholesale and retail, hotels and restaurants, and the other services sectors earn significantly less.

5.2 GENDER ANALYSIS

The results for our separate gender models are presented in Columns 2 and 3 of Table 5.1. In relation to males (Column 2), we found that literacy difficulties reduce their hourly earnings by 4.3 per cent while numeracy difficulties have no significant impact. However, the literacy coefficient is only significant at the 10 per cent level of significance, which indicates that such difficulties have only a very marginal impact on male earnings, with educational attainment, experience and sector of employment being stronger drivers of male hourly earnings. With regards to females

(Column 3), again we found that literacy skill gaps reduce their earnings while numeracy difficulties have no effect. We also found that there is a bigger wage penalty associated with literacy difficulties for females compared to males, as such a skill gap reduces their hourly earnings by 6.3 per cent compared to 4.3 per cent for males. The other wage-determining characteristics that we included in our gender models behaved as expected (Appendix Table A3), and followed a similar pattern to the model results for all employees (Appendix Table A2).

TABLE 5.1: Impact of Literacy and Numeracy Difficulties on Earnings – October 2006: Overall and by Gender

	Overall	Males	Females
Literacy Difficulty	-0.046** (0.019)	-0.043* (0.025)	-0.063** (0.029)
Numeracy Difficulty	-0.020 (0.016)	-0.030 (0.022)	0.007 (0.025)
Observations	50,401	25,451	24,950
R-squared	0.411	0.395	0.422

Note: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

5.3 EMPLOYMENT SECTOR (PUBLIC/PRIVATE) AND WORK-TYPE (FULL-TIME/PART-TIME)

When we looked at the impact that literacy and numeracy difficulties had on earnings according to a person's sector of employment (Table 5.2, Columns 1 and 2), we found that there was no effect of such skill gaps on those employed in the public sector (Column 1), while literacy difficulties reduced private sector employees' earnings by 6.9 per cent (Column 2). Again, the results for the other wage-determining characteristics that we included in our two models conformed to theory (Appendix Table A4).

In relation to work-type (Table 5.2, Columns 3 and 4), we found that there was a wage penalty associated with having a literacy difficulty in the full-time labour market (Column 3), with such employees' hourly earnings being reduced by 5.5 per cent, but no significant effect in the part-time labour market (Column 4). We also identified a marginal negative wage effect for those with a numeracy difficulty that worked full-time, but no significant effect for individuals with this skill gap that worked part-time.²⁸

²⁸ The results for the other covariates included in the Work-Type model are presented in Appendix Table A5.

TABLE 5.2: Impact of Literacy and Numeracy Difficulties on Earnings – October 2006: Employment Sector and Work-Type

	Employment Sector:		Work-Type:	
	Public Sector	Private Sector	Full-Time	Part-Time
Literacy Difficulty	0.033 (0.034)	-0.069*** (0.022)	-0.055*** (0.021)	-0.035 (0.044)
Numeracy Difficulty	-0.029 (0.036)	-0.018 (0.018)	-0.032* (0.018)	0.036 (0.042)
Observations	13,256	37,145	43,066	7,335
R-squared	0.417	0.333	0.394	0.353

Note: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

5.4 PRIVATE SECTOR FULL-TIME LABOUR MARKET

Given our findings that the wage penalty associated with literacy difficulties is confined to the private sector and to those working full-time, we ran a separate model for this labour market to identify what the overall impact was of such a skill gap on these employees. The results from this work, which are presented in Table 5.3²⁹, indicate that the hourly wage penalty for employees with a literacy difficulty that work full-time in the private sector was 8.1 per cent, which is quite large. No significant negative wage effect was identified for having a numeracy difficulty in this labour market.

TABLE 5.3: Impact of Literacy and Numeracy Difficulties on Earnings – October 2006: Private Sector Full-Time Labour Market

	Private Sector Full-Time
Literacy Difficulty	-0.081*** (0.025)
Numeracy Difficulty	-0.029 (0.020)
Observations	31,754
R-squared	0.308

Note: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

²⁹ The results for the other covariates included in this model are presented in Appendix Table A6.

5.5 EARNINGS DISTRIBUTION ANALYSIS

For our assessment of the impact of literacy and numeracy difficulties across the earnings distribution, due to our earlier findings we focussed on the private sector full-time labour market. The results of this work are presented in Table 5.4. In relation to literacy difficulties, the results indicate that it is employees that are in the middle to the upper end of the wage distribution that are most negatively affected by this skill gap. However, the impact is quite weak, with educational attainment and work experience being stronger predictors of such individuals' hourly earnings.³⁰ With regards to numeracy difficulties, even though we found that on average there was no wage penalty associated with this skill gap, the quantile regression analysis revealed that there is an earnings loss associated with having numeracy difficulties and that this penalty is concentrated in the very bottom of the wage distribution (7.9 per cent).

TABLE 5.4: Impact of Literacy and Numeracy Difficulties across the Earnings Distribution – October 2006: Private Sector Full-Time Labour Market

Earnings Quantile:	Literacy Difficulty	Numeracy Difficulty
10%	-0.020 (0.039)	-0.079** (0.038)
20%	-0.041 (0.044)	-0.029 (0.039)
30%	-0.051 (0.032)	-0.017 (0.028)
40%	-0.071* (0.036)	0.004 (0.032)
50%	-0.074* (0.041)	0.007 (0.036)
60%	-0.084* (0.044)	0.004 (0.038)
70%	-0.102** (0.042)	-0.001 (0.036)
80%	-0.092* (0.048)	-0.029 (0.041)
90%	-0.130* (0.074)	-0.013 (0.061)
Observations	31,754	

Note: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

³⁰ Results for the other covariates included in the quantile regression model are presented in Appendix Table A7.

Chapter 6

Impact of Literacy and Numeracy Difficulties on Employers' Training Expenditures

In order to carry out our analysis at the level of the firm, we reduced the NES employee based dataset to a firm-level dataset. We achieved this by retaining one observation per firm and deriving a number of variables that we use to explain both the incidence of skill gaps and training expenditures. As outlined in Equation 2, some of our variables are derived by taking firm-level averages based on employee responses while others are taken from the employer questionnaire. Variables derived from employee-level responses include the employment share of migrants, professional workers, trade union members, shift-workers, employees with specific levels of schooling and Human Resource Measures (HRM).³¹ Firm-level variables include firm size and the form of wage bargaining undertaken within the organisation. We apply establishment-level weights to these firm-level observations to ensure that our results are representative. As stated above, a firm-level skill gap is assumed to have occurred if 20 per cent or more of workers report a need for training in a particular competency.

Table 6.1 indicates that a number of firm-level attributes are associated with literacy and numeracy gaps. A number of factors are common to the incidence of both literacy and numeracy problems. Specifically, basic level skill gaps (i.e. literacy and numeracy difficulties) are more common in organisations with a high proportion of shift workers and trade-union members. Conversely, literacy and numeracy skill gaps were less common in firms employing a high proportion of immigrants and those implementing the national wage agreement. The results seem to suggest that while trade-union structures tend to protect the position of workers with literacy or numeracy skill gaps, within some organisations, however, the result may also be driven by sectoral effects that are not being fully encapsulated by our control variables,³² so further work is required. Finally the results indicate that the incidence of literacy and numeracy gaps is lower in firms employing a high share of immigrant workers suggesting that there may be some displacement of lower skilled workers.

³¹ Percentage of staff receiving performance reviews and the proportion of staff who have job descriptions.

³² In this paper we use one-digit controls for industry and it is possible that the observed trade union effect may be partly driven by the absence of a more detailed industry control variable in our models.

TABLE 6.1: Factors Influencing Probability of Literacy and Numeracy Skill Gaps Within Private Sector Firms

	Literacy	Numeracy
Average Experience	-0.000 (0.000)	0.000 (0.000)
Share of Male	-0.003 (0.006)	-0.002 (0.008)
Share of Migrants	-0.018** (0.009)	-0.036*** (0.012)
Share of Part-Time Workers	0.004 (0.009)	0.017 (0.010)
Individual-Level Bargaining	-0.000 (0.000)	0.000 (0.000)
Business-Level Bargaining	0.000 (0.000)	0.000 (0.000)
Industry-Level Bargaining	0.000 (0.000)	-0.000 (0.000)
National-Level Bargaining	-0.000** (0.000)	-0.000** (0.000)
Average Shift-Work	0.011** (0.005)	0.021** (0.008)
Average Professional Body	-0.004 (0.007)	-0.022* (0.011)
Firm Size	0.001 (0.002)	0.002 (0.002)
Trade Union Density	0.000*** (0.000)	0.000* (0.000)
Share of Staff Receiving Performance Reviews	-0.000 (0.000)	-0.000 (0.000)
Share of Staff with Job Descriptions	-0.000 (0.000)	0.000 (0.000)
Share of Staff Consulted	0.001 (0.007)	0.008 (0.007)
Observations	3,696	3,859

Note: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

In Table 6.2 we assess the extent to which skill gaps in a number of areas, including literacy and numeracy, impose additional training expenditures on private sector firms. However, it is possible that various forms of skill gaps may occur in firms with above or below average training expenditures and, if this is so, then failure to take account of such relationships will bias our results. Consequently, we ensure that our results are free from “selection bias” by applying a standard Heckman model and augmenting our models with selection terms denoted as λ .³³ The dependant variable in our model is derived by summing firm-level expenditures on training and dividing by the number of workers who received training during the year. We begin by estimating a basic

³³ The Heckman technique is a two-step estimation process that ultimately attempts to augment the outcome model (in this case training expenditures) with a representation of the joint conditional error between the level of training expenditures and the incidence of skill gaps.

specification with no controls for skill gaps; we then add measures of literacy and numeracy gaps with accompanying selection terms³⁴ before estimating a final model with controls for all forms of skill gaps (e.g. communication, customer service, management, IT, language, technical, etc.).

The results from the model are reported in Table 6.2. The results from the base model (Spec 1) conform to expectations with training expenditures higher in larger firms and those employing higher proportions of educated and/or professional labour. Conversely, average training costs were lower in organisations employing a high proportion of part-time workers. With respect to Specifications 2 through to 5 (Spec 2 to Spec 5), while there was evidence that skill gaps in the areas of management and languages raised firm-level training expenditures, no effect was detected with respect to either literacy or numeracy skill gaps. The lack of a significant result is likely to be a consequence of the low incidence of basic literacy or numeracy deficiencies within firms. However, the result may also be indicative of the fact that employers either fail to recognise such problems among their workforce or, if they do, are not of the opinion that such gaps impact productivity or performance to the extent that they warrant a training initiative. It is impossible to disentangle the possible explanations from the data at hand. However, the question certainly warrants more research.

³⁴ Selection terms control for the fact that firms experiencing skill gaps have higher (or lower) than average training expenditures independent of the presence of skill gaps.

TABLE 6.2: Impact of Skill Gaps on Private Sector Firms' Average Training Expenditures

	Spec1	Spec2	Spec3	Spec4	Spec5
Average Experience	-0.723 (1.384)	-0.789 (1.388)	-0.717 (1.380)	-0.716 (1.377)	1.326 (2.997)
Share of Male	35.450 (41.103)	33.608 (41.169)	35.660 (41.308)	33.715 (41.119)	-94.327 (77.975)
Share of Part-Time Workers	-144.221*** (40.172)	-144.791*** (40.230)	-144.507*** (40.405)	-149.858*** (41.017)	-107.039* (56.350)
Share of Junior Cert	11.984 (48.152)	14.588 (48.075)	11.933 (48.136)	17.663 (48.076)	29.179 (74.238)
Share of Leaving Cert	3.083 (48.926)	-11.503 (51.257)	4.620 (59.065)	4.759 (58.078)	-52.628 (68.422)
Share of Post-Leaving Cert	43.170 (50.164)	28.989 (52.045)	44.506 (56.906)	40.993 (55.911)	-47.320 (80.747)
Share of Cert/Diploma	220.251** (90.956)	204.686** (92.632)	221.924** (104.230)	221.891** (103.411)	46.315 (102.089)
Share of Graduate	218.642*** (79.428)	204.061** (82.877)	219.897*** (84.460)	215.607** (84.338)	-41.720 (121.641)
Individual-Level Bargaining	0.705** (0.288)	0.699** (0.289)	0.705** (0.288)	0.691** (0.288)	0.828*** (0.294)
Business-Level Bargaining	0.975 (0.709)	0.994 (0.710)	0.974 (0.715)	1.025 (0.722)	0.214 (0.730)
Industry-Level Bargaining	0.985* (0.545)	0.989* (0.544)	0.986* (0.546)	1.018* (0.548)	0.698 (0.552)
National-Level Bargaining	0.548 (0.365)	0.523 (0.370)	0.551 (0.373)	0.539 (0.374)	0.746** (0.366)
Other Bargaining	0.209 (0.449)	0.165 (0.450)	0.203 (0.450)	0.047 (0.460)	0.256 (0.527)
Average Shift-Work	-74.087 (47.226)	-70.351 (47.287)	-74.534 (48.512)	-75.097 (48.413)	-185.668*** (58.678)
Average Professional Body	293.824*** (80.214)	296.786*** (80.880)	294.129*** (80.526)	303.973*** (82.947)	120.879 (110.285)
Firm Size	107.649*** (12.753)	107.488*** (12.742)	107.627*** (12.933)	106.510*** (13.002)	-88.184 (62.227)
Trade Union Density	-0.810* (0.488)	-0.733 (0.489)	-0.814 (0.500)	-0.705 (0.483)	-0.680 (0.566)
Share of Migrants	-54.137 (46.816)	-56.200 (46.747)	-53.829 (46.635)	-51.991 (46.565)	-310.539** (147.238)
Share of Staff Consulted	66.017* (34.295)	68.597** (34.530)	65.667* (34.551)	65.351* (34.552)	-100.526* (56.311)
Literacy Gap		-272.948 (234.273)		-597.530 (374.306)	-411.068 (383.939)
Literacy λ		81.126 (100.291)		188.003 (151.019)	111.636 (155.811)
Numeracy Gap			18.994 (341.563)	416.373 (461.097)	343.079 (455.787)
Numeracy λ			-0.724 (154.146)	-140.832 (199.704)	-117.745 (195.979)
Technical Gap					199.449 (273.598)
IT Gap					-585.958 (424.691)

TABLE 6.2: Impact of Skill Gaps on Private Firms' Average Training Expenditures (continued)

	Spec1	Spec2	Spec3	Spec4	Spec5
Management Gap					1,116.485*** (393.228)
Languages Gap					785.879** (399.016)
Communications Gap					-174.893 (245.195)
Technical λ					-77.218 (170.574)
IT λ					352.284 (266.217)
Management λ					-664.759*** (243.745)
Languages λ					-500.294** (245.323)
Communications λ					106.014 (140.532)
Constant	-21.894 (164.401)	-14.108 (164.484)	-22.683 (164.695)	-21.879 (164.637)	73.043 (174.913)
Observations	4,035	4,035	4,035	4,035	4,035
R-squared	0.091	0.091	0.091	0.091	0.100

Note: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Chapter 7

Summary, Conclusions and Policy Implications

There is an extensive literature that illustrates the importance of basic literacy and numeracy skills for individual earnings, over and above the impact of educational attainment. However, very little research exists for Ireland that examines the relationship between earnings and such skill gaps. Furthermore, there appears to be no previous examination of the impact that such difficulties have on firms' training expenditures. Given this lack of important policy-related research, this current study uses data from an employer-employee linked dataset, the October 2006 National Employment Survey (NES), to assess the impact of literacy and numeracy difficulties on employees' earnings, along with their effect on private sector firms' training expenditures.

Five specific questions are addressed in the report:

1. What is the overall incidence of literacy and numeracy difficulties in the Irish workplace, and how do such needs vary by i) gender, ii) age, iii) education, iv) nationality, v) employment sector, vi) industry and vii) work type?
2. What is the correlation between literacy and numeracy needs and other skill gaps?
3. Controlling for the impact of various other wage-determining characteristics, what are the separate effects of literacy and numeracy difficulties on individual earnings, both their overall impact and also their effect across the wage distribution?
4. What are the incidences of literacy and numeracy skill gaps at the firm level?
5. Do literacy and numeracy skill gaps impose additional training expenditures on private sector firms?

We found that 1.5 per cent of employees indicated that they had a literacy difficulty, while 2 per cent reported a numeracy difficulty. The rates for both skill gaps were higher among males than females. When we looked at the prevalence of literacy and numeracy difficulties by educational attainment, we found that 6 per cent of those with a Junior Certificate qualification reported having a literacy difficulty, while 9 per cent indicated that they had a numeracy difficulty. The corresponding figures for those with no formal education were 5 per cent

(literacy difficulty) and 7 per cent (numeracy difficulty) respectively. Similar proportions of public and private sector workers reported having a literacy difficulty, while a slightly higher percentage of those working in the private sector indicated that they had a numeracy difficulty. In relation to industry, the highest incidence of literacy skill gaps was reported by those working in the transport sector, while the lowest was recorded among financial sector and education workers. With regards to numeracy difficulties, those employed in the wholesale and retail, transport and other services sectors reported the highest incidence of such difficulties, while the lowest was recorded among those employed in the education and financial sector industries.

When we investigated the impact of literacy and numeracy skill gaps on employee earnings, we found that literacy difficulties reduced an individual's earnings by 4.6 per cent, while no significant wage penalty was found for numeracy difficulties. The wage discount associated with literacy difficulties was larger for females (6.3 per cent) than for males (4.3 per cent), which is a noteworthy finding given that a slightly higher proportion of males reported having literacy difficulties. Another striking result was that the earnings loss associated with a literacy difficulty is confined to the private sector, and in particular those working full-time: individuals reporting literacy difficulties employed in this labour market earn 8.1 per cent less, a substantial wage penalty. On average there is no wage penalty associated with having a numeracy difficulty, but we did identify a marginal negative wage effect for employees with this skill gap that worked full-time. In addition, the earnings distribution analysis revealed that the earnings loss associated with having a numeracy difficulty is concentrated among workers in the very bottom of the earnings distribution (7.9 per cent). The quantile regression analysis also revealed that it is employees that are in the middle to the upper end of the earnings distribution that are most negatively affected by having a literacy difficulty. This result is over and above the impact of educational attainment. Thus, while individuals with low levels of education can progress up the wage distribution, this analysis reveals that there is an earnings loss attached to having a literacy difficulty that increases somewhat as one moves up the income distribution.

With respect to the private sector firm-level analysis, we found that 1.4 per cent of firms experience significant literacy skill gaps among their staff, with the corresponding figure for numeracy skill gaps standing at 2.4 per cent. The distribution of both literacy and numeracy skill gaps is generally evenly spread across industries; however, the incidence was substantially higher in the transport sector and lower in the financial sector. There was also some evidence that both literacy and numeracy skill gaps were more common in very large

private sector firms employing more than 100 people. The multivariate analysis revealed that trade-union structures tend to protect the position of workers with literacy or numeracy skill gaps; however, there is also evidence to suggest that, within some organisations, workers with basic skill gaps (i.e. literacy and numeracy difficulties) may be being displaced by more qualified immigrants.

We find no evidence that either literacy or numeracy skill gaps are associated with higher private sector firm-level training expenditures. The research found that employers were more likely to respond to skill gaps in the areas of management or language skills. However, the lack of a statistically significant finding at the firm-level cannot be assumed to provide evidence that numeracy and/or literacy skill gaps do not impact company performance. The insignificant result may also be driven by employers failing to recognise that such problems exist among their workforce, which, in turn, may be a consequence of poor organisational Human Resource Management structures (McGuinness and Ortez, forthcoming).

The main policy implication from this report relates to the provision of appropriate training to deal with literacy and numeracy difficulties among employees, particularly in the private sector. International research on the impact that such skill gaps have on an individual's earnings has found that the wage penalty associated with literacy and numeracy difficulties can be reduced through the provision of suitable training. Indeed, the greatest returns can occur from training of those with lowest qualifications. Thus, from an Irish perspective, policy needs to focus on the provision of courses in the areas of literacy and numeracy difficulties.

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Appendix

TABLE A1: Characteristic Information on Working-Age Employees covered by the NES October 2006

Working-Age Employees	
Gender:	
Male	52.4
Female	47.6
Age:	
Age 16-24	18.1
Age 25-34	30.3
Age 35-44	23.4
Age 45-54	18.4
Age 55-64	9.8
Nationality:	
Irish	88.1
Non-Irish	11.9
Educational Attainment:	
Primary or Less	10.6
Junior Certificate	14.4
Leaving Certificate	30.0
Post-Secondary	11.0
Third-Level: No Degree	11.6
Third-Level: Degree	22.4
Work-Type:	
Full-Time	82.4
Part-Time	17.6
Employment Sector:	
Private	75.5
Public	24.5
Industry:	
Manufacturing	15.4
Electricity	0.7
Construction	12.6
Wholesale & Retail	14.7
Hotels & Restaurants	6.5
Transport, Storage & Communication	5.5
Financial Sector	5.1
Business Services	8.8
Public Administration & Defence	6.0
Education	7.9
Health	11.7
Other Services	5.0
Other Job Characteristics:	
Supervise Staff	33.5
Shift-Work	27.7
Professional Body Member	15.3
Trade Union Member	38.4

Source: Constructed with Data from the *National Employment Survey October 2006*, CSO.

TABLE A2: Impact of Literacy and Numeracy Difficulties on Earnings – October 2006: All Employees

	Overall
Male	0.144*** (0.004)
Experience	0.031*** (0.001)
Experience-Squared	-0.000*** (0.000)
<i>Educational Attainment (Ref: Primary or Less):</i>	
Junior Certificate	0.044*** (0.007)
Leaving Certificate	0.132*** (0.007)
Post-Secondary	0.162*** (0.008)
Third-Level: No Degree	0.245*** (0.008)
Third-Level: Degree	0.463*** (0.008)
Literacy Difficulty	-0.046** (0.019)
Numeracy Difficulty	-0.020 (0.016)
Non-Irish	-0.112*** (0.006)
Full-Time Employee	0.120*** (0.005)
Supervise Staff	0.140*** (0.004)
Shift-Work	-0.031*** (0.004)
Professional Body Member	0.058*** (0.006)
Trade Union Member	0.081*** (0.004)
<i>Industry (Ref: Manufacturing):</i>	
Electricity	0.356*** (0.022)
Construction	0.083*** (0.007)
Wholesale & Retail	-0.075*** (0.007)
Hotels & Restaurants	-0.155*** (0.009)
Transport, Storage & Communication	0.070*** (0.009)
Financial Sector	0.207*** (0.010)
Business Services	-0.007 (0.008)

TABLE A2: Impact of Literacy and Numeracy Difficulties on Earnings - October 2006: All Employees (continued)

	Overall
<i>Industry (Ref: Manufacturing):</i>	
Public Administration & Defence	0.154*** (0.009)
Education	0.374*** (0.009)
Health	0.157*** (0.008)
Other Services	-0.073*** (0.009)
Constant	1.984*** (0.010)
Observations	50,401
R-squared	0.411

Note: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

TABLE A3: Impact of Literacy and Numeracy Difficulties on Earnings - October 2006: Gender Analysis

	Males	Females
Experience	0.037*** (0.001)	0.025*** (0.001)
Experience-Squared	-0.001*** (0.000)	-0.000*** (0.000)
Educational Attainment (Ref: Primary or Less):		
Junior Certificate	0.056*** (0.010)	0.030*** (0.011)
Leaving Certificate	0.140*** (0.009)	0.128*** (0.010)
Post-Secondary	0.199*** (0.011)	0.099*** (0.012)
Third-Level: No Degree	0.260*** (0.012)	0.228*** (0.011)
Third-Level: Degree	0.478*** (0.011)	0.440*** (0.011)
Literacy Difficulty	-0.043* (0.025)	-0.063** (0.029)
Numeracy Difficulty	-0.030 (0.022)	0.007 (0.025)
Non-Irish	-0.108*** (0.008)	-0.113*** (0.009)
Full-Time Employee	0.161*** (0.011)	0.111*** (0.006)
Supervise Staff	0.161*** (0.006)	0.105*** (0.006)
Shift-Work	-0.031*** (0.006)	-0.030*** (0.006)
Professional Body Member	0.051*** (0.008)	0.066*** (0.008)
Trade Union Member	0.079*** (0.006)	0.086*** (0.006)
Industry (Ref: Manufacturing):		
Electricity	0.366*** (0.027)	0.310*** (0.045)
Construction	0.096*** (0.008)	0.042* (0.023)
Wholesale & Retail	-0.062*** (0.009)	-0.090*** (0.010)
Hotels & Restaurants	-0.169*** (0.014)	-0.144*** (0.012)
Transport, Storage & Communication	0.061*** (0.011)	0.088*** (0.016)
Financial Sector	0.259*** (0.015)	0.176*** (0.013)
Business Services	0.011 (0.011)	-0.024** (0.012)
Public Administration & Defence	0.161*** (0.013)	0.149*** (0.013)
Education	0.440*** (0.015)	0.346*** (0.012)
Health	0.115*** (0.016)	0.163*** (0.010)
Other Services	-0.078*** (0.014)	-0.073*** (0.013)

TABLE A3: Impact of Literacy and Numeracy Difficulties on Earnings - October 2006: Gender Analysis (continued)

	Males	Females
<i>Industry (Ref: Manufacturing):</i>		
Constant	1.999*** (0.016)	2.083*** (0.014)
Observations	25,451	24,950
R-squared	0.395	0.422

Note: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

TABLE A4: Impact of Literacy and Numeracy Difficulties on Earnings - October 2006: Sector Analysis

	Public Sector	Private Sector
Male	0.138*** (0.008)	0.140*** (0.005)
Experience	0.027*** (0.001)	0.031*** (0.001)
Experience-Squared	-0.000*** (0.000)	-0.000*** (0.000)
<i>Educational Attainment (Ref: Primary or Less):</i>		
Junior Certificate	0.046*** (0.015)	0.039*** (0.009)
Leaving Certificate	0.170*** (0.013)	0.114*** (0.008)
Post-Secondary	0.143*** (0.017)	0.160*** (0.009)
Third-Level: No Degree	0.297*** (0.015)	0.223*** (0.010)
Third-Level: Degree	0.513*** (0.014)	0.407*** (0.009)
Literacy Difficulty	0.033 (0.034)	-0.069*** (0.022)
Numeracy Difficulty	-0.029 (0.036)	-0.018 (0.018)
Non-Irish	-0.062*** (0.015)	-0.106*** (0.006)
Full-Time Employee	0.083*** (0.009)	0.112*** (0.006)
Supervise Staff	0.082*** (0.008)	0.172*** (0.005)
Shift-Work	0.045*** (0.008)	-0.058*** (0.005)
Professional Body Member	0.046*** (0.008)	0.056*** (0.007)
Trade Union Member	0.038*** (0.008)	0.062*** (0.005)
Observations	13,256	37,145
R-squared	0.417	0.333

Note: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; Sector controls included.

Table A5: Impact of Literacy and Numeracy Difficulties on Earnings – October 2006: Work-Type Analysis

	Full-Time	Part-Time
Male	0.148*** (0.005)	0.052*** (0.013)
Experience	0.034*** (0.001)	0.016*** (0.002)
Experience-Squared	-0.001*** (0.000)	-0.000*** (0.000)
<i>Educational Attainment (Ref: Primary or Less):</i>		
Junior Certificate	0.040*** (0.008)	0.038** (0.017)
Leaving Certificate	0.128*** (0.008)	0.135*** (0.015)
Post-Secondary	0.159*** (0.009)	0.163*** (0.020)
Third-Level: No Degree	0.245*** (0.009)	0.233*** (0.019)
Third-Level: Degree	0.471*** (0.008)	0.400*** (0.019)
Literacy Difficulty	-0.055*** (0.021)	-0.035 (0.044)
Numeracy Difficulty	-0.032* (0.018)	0.036 (0.042)
Non-Irish	-0.117*** (0.006)	-0.055*** (0.016)
Supervise Staff	0.148*** (0.004)	0.060*** (0.013)
Shift-Work	-0.029*** (0.005)	-0.030*** (0.011)
Professional Body Member	0.063*** (0.006)	0.053*** (0.017)
Trade Union Member	0.080*** (0.005)	0.101*** (0.011)
<i>Industry (Ref: Manufacturing):</i>		
Electricity	0.352*** (0.022)	0.291* (0.171)
Construction	0.092*** (0.007)	-0.071* (0.040)
Wholesale & Retail	-0.065*** (0.007)	-0.144*** (0.025)
Hotels & Restaurants	-0.162*** (0.010)	-0.173*** (0.027)
Transport, Storage & Communication	0.068*** (0.009)	0.072* (0.038)
Financial Sector	0.192*** (0.010)	0.341*** (0.034)
Business Services	0.016* (0.008)	-0.132*** (0.027)
Public Administration & Defence	0.157*** (0.009)	0.094*** (0.036)
Education	0.383*** (0.010)	0.320*** (0.028)
Health	0.136*** (0.008)	0.185*** (0.025)
Other Services	-0.083*** (0.010)	-0.069** (0.029)

TABLE A5: Impact of Literacy and Numeracy Difficulties on Earnings – October 2006: Work-Type Analysis (continued)

	Full-Time	Part-Time
<i>Industry (Ref: Manufacturing):</i>		
Constant	2.066*** (0.010)	2.169*** (0.029)
Observations	43,066	7,335
R-squared	0.394	0.353

Note: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

TABLE A6: Impact of Literacy and Numeracy Difficulties on Earnings – October 2006: Private Sector Full-Time Labour Market

	Private Sector Full-Time
Male	0.148*** (0.005)
Experience	0.034*** (0.001)
Experience-Squared	-0.001*** (0.000)
<i>Educational Attainment (Ref: Primary or Less):</i>	
Junior Certificate	0.027*** (0.010)
Leaving Certificate	0.102*** (0.009)
Post-Secondary	0.153*** (0.010)
Third-Level: No Degree	0.219*** (0.011)
Third-Level: Degree	0.418*** (0.010)
Literacy Difficulty	-0.081*** (0.025)
Numeracy Difficulty	-0.029 (0.020)
Non-Irish	-0.115*** (0.007)
Supervise Staff	0.178*** (0.005)
Shift-Work	-0.061*** (0.006)
Professional Body Member	0.064*** (0.008)
Trade Union Member	0.068*** (0.006)
<i>Industry (Ref: Manufacturing):</i>	
Electricity	-0.089 (0.100)
Construction	0.073*** (0.008)

TABLE A6: Impact of Literacy and Numeracy Difficulties on Earnings – October 2006: Private Sector Full-Time Labour Market (continued)

	Private Sector Full-Time
<i>Industry (Ref: Manufacturing):</i>	
Wholesale & Retail	-0.079*** (0.008)
Hotels & Restaurants	-0.172*** (0.010)
Transport, Storage & Communication	0.029** (0.012)
Financial Sector	0.184*** (0.011)
Business Services	0.008 (0.009)
Public Administration & Defence	0.000 (0.000)
Education	-0.082*** (0.022)
Health	-0.050*** (0.015)
Other Services	-0.103*** (0.011)
Constant	2.110*** (0.012)
Observations	31,754
R-squared	0.308

Note: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

**Table A7: Impact of Literacy and Numeracy Difficulties across the Earnings Distribution – October 2006:
Private Sector Full-Time Labour Market**

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
Male	0.091*** (0.007)	0.113*** (0.008)	0.126*** (0.006)	0.137*** (0.007)	0.152*** (0.008)	0.157*** (0.009)	0.167*** (0.008)	0.158*** (0.009)	0.185*** (0.013)
Experience	0.025*** (0.001)	0.030*** (0.001)	0.030*** (0.001)	0.032*** (0.001)	0.032*** (0.001)	0.034*** (0.001)	0.035*** (0.001)	0.038*** (0.001)	0.040*** (0.002)
Experience-Squared	-0.000*** (0.000)	-0.001*** (0.000)	-0.000*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
Junior Certificate	0.080*** (0.015)	0.079*** (0.016)	0.059*** (0.012)	0.041*** (0.015)	0.046*** (0.018)	0.037* (0.019)	0.019 (0.019)	-0.009 (0.021)	-0.057* (0.033)
Leaving Certificate	0.077*** (0.015)	0.117*** (0.015)	0.112*** (0.012)	0.107*** (0.014)	0.117*** (0.017)	0.132*** (0.019)	0.115*** (0.018)	0.101*** (0.021)	0.069** (0.033)
Post Secondary	0.154*** (0.015)	0.193*** (0.016)	0.181*** (0.012)	0.172*** (0.015)	0.168*** (0.018)	0.176*** (0.020)	0.166*** (0.020)	0.144*** (0.022)	0.089*** (0.034)
Third-Level No Degree	0.180*** (0.016)	0.225*** (0.016)	0.227*** (0.013)	0.223*** (0.015)	0.231*** (0.018)	0.251*** (0.020)	0.235*** (0.019)	0.228*** (0.022)	0.179*** (0.034)
Third-Level Degree	0.301*** (0.016)	0.364*** (0.017)	0.386*** (0.013)	0.400*** (0.015)	0.420*** (0.018)	0.459*** (0.020)	0.468*** (0.019)	0.483*** (0.021)	0.466*** (0.033)
Literacy Difficulty	-0.020 (0.039)	-0.041 (0.044)	-0.051 (0.032)	-0.071* (0.036)	-0.074* (0.041)	-0.084* (0.044)	-0.102** (0.042)	-0.092* (0.048)	-0.130* (0.074)
Numeracy Difficulty	-0.079** (0.038)	-0.029 (0.039)	-0.017 (0.028)	0.004 (0.032)	0.007 (0.036)	0.004 (0.038)	-0.001 (0.036)	-0.029 (0.041)	-0.013 (0.061)
Non-Irish	-0.109*** (0.010)	-0.109*** (0.010)	-0.108*** (0.008)	-0.112*** (0.010)	-0.108*** (0.012)	-0.110*** (0.013)	-0.111*** (0.012)	-0.105*** (0.013)	-0.135*** (0.019)
Supervisory Role	0.134*** (0.008)	0.157*** (0.008)	0.161*** (0.006)	0.162*** (0.007)	0.169*** (0.008)	0.174*** (0.009)	0.188*** (0.009)	0.190*** (0.010)	0.213*** (0.014)
Shift-Work	-0.021** (0.009)	-0.042*** (0.009)	-0.044*** (0.007)	-0.046*** (0.008)	-0.051*** (0.009)	-0.050*** (0.010)	-0.043*** (0.010)	-0.027** (0.011)	-0.045*** (0.015)
Professional Body	-0.041*** (0.010)	0.008 (0.011)	0.031*** (0.008)	0.052*** (0.010)	0.061*** (0.012)	0.071*** (0.013)	0.084*** (0.012)	0.085*** (0.014)	0.095*** (0.020)
TU Member	0.099*** (0.008)	0.094*** (0.009)	0.099*** (0.007)	0.093*** (0.008)	0.087*** (0.009)	0.077*** (0.010)	0.065*** (0.010)	0.055*** (0.012)	0.039** (0.018)
Electricity	-0.269*** (0.027)	-0.421*** (0.040)	-0.371*** (0.102)	-0.290** (0.130)	-0.119 (0.127)	-0.040 (0.116)	0.106 (0.095)	0.156* (0.090)	0.004 (0.100)
Construction	-0.018 (0.012)	0.020 (0.013)	0.067*** (0.010)	0.089*** (0.012)	0.092*** (0.014)	0.106*** (0.015)	0.107*** (0.014)	0.117*** (0.016)	0.123*** (0.023)
Wholesale & Retail	-0.105*** (0.010)	-0.124*** (0.011)	-0.123*** (0.008)	-0.112*** (0.010)	-0.106*** (0.011)	-0.095*** (0.012)	-0.075*** (0.011)	-0.044*** (0.012)	-0.030* (0.017)
Hotels & Restaurants	-0.137*** (0.014)	-0.154*** (0.016)	-0.182*** (0.012)	-0.184*** (0.015)	-0.193*** (0.018)	-0.208*** (0.020)	-0.224*** (0.019)	-0.237*** (0.022)	-0.209*** (0.032)
Transport	-0.056*** (0.019)	-0.046** (0.019)	-0.021 (0.014)	-0.011 (0.017)	0.013 (0.019)	0.030 (0.021)	0.038* (0.020)	0.092*** (0.023)	0.150*** (0.036)
Financial Sector	0.173*** (0.011)	0.157*** (0.012)	0.167*** (0.010)	0.204*** (0.012)	0.209*** (0.014)	0.195*** (0.015)	0.195*** (0.014)	0.200*** (0.016)	0.161*** (0.022)
Business Services	-0.061*** (0.011)	-0.060*** (0.012)	-0.034*** (0.009)	-0.012 (0.010)	0.007 (0.012)	0.021 (0.013)	0.030** (0.012)	0.037*** (0.014)	0.044** (0.020)
Education	-0.107*** (0.032)	-0.092*** (0.031)	-0.121*** (0.028)	-0.112*** (0.033)	-0.118*** (0.037)	-0.113*** (0.039)	-0.109*** (0.038)	-0.080** (0.041)	0.019 (0.065)
Health	-0.078*** (0.017)	-0.103*** (0.019)	-0.074*** (0.014)	-0.045*** (0.016)	-0.025 (0.019)	-0.036* (0.020)	-0.040** (0.019)	-0.039* (0.021)	-0.033 (0.030)
Other Services	-0.195*** (0.019)	-0.167*** (0.018)	-0.171*** (0.014)	-0.150*** (0.015)	-0.122*** (0.017)	-0.102*** (0.018)	-0.086*** (0.017)	-0.086*** (0.019)	-0.023 (0.027)
Constant	1.855*** (0.018)	1.897*** (0.018)	1.969*** (0.015)	2.017*** (0.018)	2.070*** (0.021)	2.116*** (0.023)	2.199*** (0.022)	2.295*** (0.024)	2.478*** (0.035)
Observations	31,754	31,754	31,754	31,754	31,754	31,754	31,754	31,754	31,754

Note: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.



The Economic & Social Research Institute
Whitaker Square
Sir John Rogerson's Quay
Dublin 2, Ireland
+ 353 1 863 2000 www.esri.ie
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